

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
)	
Revisions of Part 15 of the Commission's)	ET Docket No. 13-49
Rules to Permit Unlicensed National)	
Information Infrastructure (U-NII) Devices in)	
the 5 GHz Band)	

To: The Commission

**COMMENTS OF HUAWEI TECHNOLOGIES, INC. (USA) and
HUAWEI TECHNOLOGIES CO., LTD.**

Huawei Technologies, Inc. (USA) and Huawei Technologies Co., Ltd. (collectively “Huawei”)¹ submit these comments in response to the Public Notice (“Notice”) issued by the Federal Communications Commission’s (“FCC” or “Commission”) to update and refresh the record in its proceeding on Unlicensed National Information Infrastructure (“U-NII”) Devices in the 5 GHz Band.² Huawei commends the Commission for undertaking this action to better gauge potential sharing solutions between proposed U-NII devices and Dedicated Short Range Communications (“DSRC”) operations in the 5.850-5.925 GHz (“5.9 GHz” or “U-NII-4”) band.³

¹ Huawei Technologies Co., Ltd. is a Chinese corporation with its principal place of business at Bantian, Longgong District, Shenzhen, People’s Republic of China. U.S.-based subsidiaries include Huawei Technologies, Inc. (USA), Huawei Devices USA, Inc., and Futurewei Technologies, Inc. [collectively “Huawei Technologies, Inc. (USA)”]. A global leader of information and communications technology (“ICT”) products and solutions, Huawei pursues continuous ICT innovation to create maximum value for telecommunications carriers, enterprises, and consumers. The company’s vision is to enrich life and improve efficiency through “a better connected world.” See <http://www.huawei.com/en/>.

² See *The Commission Seeks to Update and Refresh the Record in the “Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band” Proceeding*, ET Docket No. 13-49, Public Notice, FCC 16-68 (rel. June 1, 2016) (“Public Notice”).

³ See *Id.* See also 47 C.F.R. § 2.106. Table of Frequency Allocations; and see *Revisions of Part 15 of the Commission’s Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, ET-Docket 13-49, Notice of Proposed Rulemaking, 28 FCC Rcd 1769, 1798-1801 (2013) (“NPRM”) (seeking public comment on technical requirements for unlicensed devices and spectrum sharing technologies to protect against harmful interference to incumbent services in the U-NII-4 band).

With updated information on potential sharing solutions for this band, the FCC will be better positioned to fulfill its earlier stated purpose of “explor[ing] fully ways to reduce significantly the potential for interference to authorized users of the 5 GHz band that arise from U-NII operations,” particularly for a service “configured to support safety-critical applications.” That imperative, Huawei submits, is equally important today as it was when FCC launched its review on the rules governing the 5.9 GHz three years ago.⁴

The FCC initially allocated 75 MHz in the 5.9 GHz band for DSRC operations on a primary basis 17 years ago.⁵ Since that time, “the U.S. Department of Transportation has worked diligently and collaboratively with industry and public sector stakeholders to develop and evaluate new cooperative technologies, equipment, and applications known as ‘Connected Vehicle (CV) technologies.’”⁶ As noted one year ago by the U.S. Department of Transportation (“USDOT”) in the statutorily-mandated *Report to Congress*, “a critical assumption in the development of DSRC-based technologies and applications was that spectrum sharing [with broadband unlicensed devices] was not intended.”⁷ And while testing and evaluation on the potential co-existence of DSRC with unlicensed wireless devices is in process, the report explains that early analyses indicate that U-NII devices “would deny or interfere with safety-critical [vehicle-to-vehicle] messages.”⁸

⁴ See NPRM at 1776.

⁵ See *Amendment of Parts 2 and 90 of the Commission’s Rules to Allocate 5.850-5.925 GHz Band to the Mobile Service for Dedicated Short-Range Communications of Intelligent Transportation Services*, ET-Docket No. 98-95, Report and Order, 14 FCC Rcd 18221 (1999).

⁶ See STATUS OF THE DEDICATED SHORT-RANGE COMMUNICATIONS TECHNOLOGY AND APPLICATIONS: REPORT TO CONGRESS, Intelligent Transportation Systems Joint Program Office, U.S. Department of Transportation (July 2015) at 2 (“Report to Congress”).

⁷ See *Id.* at 11. Also see Moving Ahead for Progress in the 21st Century Act (MAP-21) P.L. No. 112-141 (2012) div. E, title III, § 53006(a), July 6, 2012, 126 Stat. 904 (2012).

⁸ See Report to Congress at 63 (acknowledging that little is known about how U-NII devices would operate on spectrum shared with DSRC because of the lack of U-NII devices).

Huawei also observes that the U.S. Government Accountability Office (“GAO”)—a government agency renowned as the purveyor of information to the United States Congress considered to be “objective, nonpartisan, nonideological, fair, and balanced,”⁹—released a report in September 2015 revealing that both DOT officials and most of the diverse group of experts interviewed by GAO believe that spectrum sharing in the 5.9 GHz band presents a “significant challenge to deploying [vehicle-to-infrastructure] technologies” and that “harmful interference from unlicensed devices may jeopardize crash avoidance capabilities.”¹⁰ The report further discusses a decision of Japan’s Ministry of Internal Affairs and Communications to reject a plan that enabled spectrum sharing between vehicle-to-infrastructure services and unlicensed devices on the grounds that “sharing could lead to delays or harmful interference with [vehicle-to-infrastructure] messages.”¹¹

Recent efforts undertaken by USDOT, FCC, other government agencies and industry to evaluate the feasibility of spectrum sharing in the 5.9 GHz band are critically important to better understand the potential for harmful interference of U-NII devices to DSRC systems and thus undermining years of investment in research and development on connected vehicle technologies. Indeed, Huawei believes that the FCC should give due consideration to the important initiatives undertaken over the past 17 years by the Intelligent Transportation Systems (“ITS”) Joint Program Office (“JPO”) within the USDOT and the automotive industry to develop and deploy technologies that deliver safety-related applications for connected vehicles.

⁹ See “Our Mission,” U.S. Government Accountability Office, *available at*: <http://www.gao.gov/about/index.html>.

¹⁰ See INTELLIGENT TRANSPORTATION SYSTEMS: VEHICLE-TO-INFRASTRUCTURE TECHNOLOGIES EXPECTED TO OFFER BENEFITS, BUT CHALLENGES EXIST,” U.S. Government Accountability Office, GAO-15-775 (Sept.2015) at 19 (“GAO Report”).

¹¹ See *Id.* at 20. Notably, the GAO report explains the Japanese government’s view that harmful interference of vehicle-to-infrastructure transmissions could “degrade the public’s trust, consequently slowing down acceptance of the [vehicle-to-infrastructure] systems in Japan.” *Id.*

Huawei therefore holds the view that the need for interference-free access to DSRC channels for safety-of-life communication is so compelling that, in the absence of FCC designating the 5.9 GHz band as exclusive for DSRC, the Commission should adopt a re-channelization mechanism in its rules for this band to ensure that, at a very minimum, specific segments designated for safety-related communications remain exclusive to DSRC, with sharing of U-NII and non-safety DSRC systems limited to other segments of the band.¹²

I. DSRC Technology

The USDOT *Report to Congress* explains that “a decade of research and development advancements on DSRC technologies, channel testing, applications and standards provide a near comprehensive set of results as basis for deployment.”¹³ That is to say, in the opinion of USDOT, industry and public sector stakeholders “DSRC technologies and applications have reached *a level of stability* [emphasis added] that supports deployment.”¹⁴ While the *Report to Congress* acknowledges the existence of gaps that require “greater specificity on issues such as spectrum usage, performance requirements or final standards,”¹⁵ the resources, investment and effort that the government and industry stakeholders have devoted to DSRC technologies has been substantial and should continue unabated through the deployment phase.

DSRC research and development has focus on enabling communications transmissions among vehicles and infrastructure to enhance vehicle safety.¹⁶ Of particular relevance for safety-

¹² See Public Notice at 7.

¹³ See Report to Congress at 55.

¹⁴ See *Id.*

¹⁵ See *Id.* at 61. The report states that as DSRC technology is now sufficiently mature, gaps have predominantly been addressed. Uncertainties related to the potential for interference caused by unlicensed devices are said to be causing both technical and organizations uncertainties. See *Id.*

¹⁶ See GAO Report at 7 (stating that USDOT considers DSRC technology to be the designated communication technology for communications-based active safety systems research).

related applications, DSRC technologies operating in the 5.9 GHz band are known to feature the attributes of low latency, high reliability and consistent availability.¹⁷ Although the ability for DSRC to scale is yet unknown and other communications technologies, such as LTE-V and “5G” or Fifth Generation wireless technology, are likely to play a significant role in the introduction of connected vehicles, broad and active safety measures such as redundancy made possible by complementary wireless technologies, will enable the realization and viability of connected vehicles.

With respect to other communications technologies supporting connected vehicles, sensor technologies are currently used in automobiles for active safety detection, and industry-defined specifications for LTE-V (i.e., Long-Term Evolution-Vehicle) supported by 4G wireless spectrum is being developed for longer distance routing and vehicle information.¹⁸ With standards-development currently in process, LTE-V will enable safety-related services and include requirements and performance measures on values such as maximum latency and reliability. Also with large-scale deployment of LTE, the LTE-V2X (i.e., vehicle-to-vehicle) solution is expected to be viable, supporting ambiguous coverage that enables “cooperative awareness” of vehicles with other vehicles, infrastructures and pedestrians.¹⁹

Accordingly, Huawei believes that no single wireless technology can deliver the full scope of public safety services necessary for connected vehicles to become commercially viable. Rather, FCC rules should remain technology-neutral as to the evolution and innovation in

¹⁷ *See Id.*

¹⁸ *See* Technical Specification Group Services and System Aspects; Study on LTE support for Vehicle to Everything (V2X) Services (Release 14), Technical Report, 3GPP TR 22.885 V 14.0.0, 3rd Generation Partnership Project (Dec. 2015), *available at*: http://www.3gpp.org/ftp/specs/archive/22_series/22.885/22885-e00.zip. This 3GPP technical report covers use cases and potential requirements for LTE support for vehicular communications (represented by the term “Vehicle-to-Everything (V2X) Services”).

¹⁹ *See Id.* at 9. The technical report identifies three different types of V2X services—vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), and vehicle-to-pedestrian (V2P) communications—all of which can ‘use “co-operative awareness” to provide more intelligent services for end-users.’ *See Id.*

connected vehicles and infrastructure. More precisely, Huawei believes that the Commission should not limit the potential of DSRC technologies to support safety-related connected vehicle applications by weakening protection from harmful interference that may be caused by U-NII devices operating on a shared basis in the 5.9 GHz band.

II. Sharing Approaches

Huawei commends the efforts of the FCC, the Institute of Electrical and Electronics Engineers (“IEEE”) and its members,²⁰ other government and industry stakeholders in exploring methods for sharing and interference avoidance in the 5.9 GHz band in order to reach consensus on an acceptable solution that will increase the availability of spectrum for unlicensed services and devices without compromising incumbent, i.e., DSRC, operations. As explained in the FCC Notice, two approaches for spectrum sharing in this band have been proposed—“detect and avoid” and “re-channelization.”²¹ From Huawei’s perspective, each of these proposed interference detection techniques hold some merit; however, each also has certain weaknesses.

Detect-and-avoid would require monitoring of the entire ITS band and, upon the detection of a DSRC signal, render the entire band unavailable for use by unlicensed devices for the duration of such detection. Huawei believes this scenario effectively repurposes the non-exclusive designation of the entire 75 MHz of spectrum in the 5.9 GHz band into an exclusive purpose designation for an indefinite period of time. And despite best efforts to avoid interference with DSRC signals, such safety-of-life communications would remain subject to potential interference.

²⁰ See Letter from Paul Nikolich, IEEE 802 LAN/MAN Standards Committee Chairman, to Marlene H. Dortch, Secretary, FCC, ET-Docket-13-49 (May 12, 2015) (providing access to the complete record of the IEEE DSRC Coexistence Tiger Team on sharing between wireless local area networks and DSRC).

²¹ See Public Notice at 5-9. See also GAO Report at 21 (describing industry efforts to evaluate potential options and technologies that would allow unlicensed devices to use the 5.9 GHz band without causing harmful interference to licensed devices).

Re-channelization, which reconfigures the upper 30 MHz of the 5.9 GHz band for safety-of-life DSRC channels with the intention of protecting protect these channels from harmful interference, has the potential to delay deployment of intelligent transportation systems, such as connected vehicles, in the United States and cause a undesirable set-back in decades of R&D investment made in DSRC technologies. Further, Huawei believes that a hybrid approach that combines detect-and-avoid and re-channelization, as suggested in the Notice,²² does little to address the challenges of either method. Huawei therefore observes that neither of these sharing proposals will result in a win-win scenario for DSRC and U-NII devices.

III. The Safest Approach

Huawei believes that: 1) in the absence of the FCC allocating the 5.9 GHz band for exclusive use; 2) recognizing that shared use of the band with U-NII devices will impose challenges and delays in ITS implementation; and 3) no other sharing proposal exists or is likely to be developed that eliminates harmful interference to DSRC communications, the better approach is re-channelization, i.e., dedicating the upper 30 MHz of the band to safety-of-life channels. The re-channelization approach has the primary benefit of creating two separate continuous frequency blocks, one designated for exclusive use of safety-related DSRC communications, as noted, and the other shared between U-NII and non-safety DSRC communications.²³ Although this method would limit safety-related DSRC communications to 30 MHz, it has the virtue of doing so on an exclusive basis, thereby essentially eliminating the risk of harmful interference of safety-to-life communications.

From Huawei's perspective, the exclusive safety-of life channels in the upper 30 MHz of the band should be defined by the ITS for vehicle-to-vehicle crash avoidance, control channel

²² See Public Notice at 9 (citation omitted).

²³ See *Id* at 7.

and basic safety messaging. A channel also could be allocated for relevant emergency broadcast messages via DSRC /802.11p and/or LTE-V. Huawei reiterates that a single technology, e.g., DSRC, will limit realization of the plan envisioned by DOT and ITS/JPO in the *ITS 2015-2019 Strategy Plan*.²⁴ The development of next generation technologies such as LTE-V, can assist in realizing the strategy, particularly in delivering the promise of connected vehicles.

IV. Conclusion

In its 2013 Notice of Proposed Rulemaking in this proceeding, the FCC characterized DSRC as communications that “need secure, wireless interface dependability in extreme weather conditions, and short time delays” in order to “save lives by warning drivers of an impending dangerous condition or event in time to take corrective action or evasive actions.”²⁵ The alternative, purported safety-of-life communications impaired by harmful interference, could result in the loss of property or worse, the loss of life—risks that are directly antithetical to the very purpose of DSRC systems.

While Huawei strongly supports initiatives undertaken by the FCC and other industry and government stakeholders to increase the availability of spectrum for mobile broadband services through spectrum sharing,²⁶ safety-to-life communications should be a priority in spectrum policy. Huawei believes that dedicated or exclusive spectrum is imperative for critical DSRC channels. While neither of the approaches outlined in the Notice is as beneficial as designating the entire 75 MHz in the 5.9 GHz band as exclusive for DSRC, a re-channelization approach has the virtue of doing so in the upper 30 MHz of the band for safety-related communications.

²⁴ See ITS 2015-2019 STRATEGIC PLAN, U.S. Department of Transportation, Intelligent Transportation Systems Joint Program Office, FHWA-JPO-14-145 (May 15, 2014), available at: www.its.dot.gov/strategicplan/index.html.

²⁵ See *NPRM* at 10.

²⁶ See Comments of Huawei Technologies, Inc. (USA) and Huawei Technologies Co., Ltd., ET Docket 15-105 (June 11, 2015).

Huawei encourages the Commission to consider: the potential impact on public trust and adoption of connected vehicle technologies in the United States from possible harmful interference to safety-of-life communications; and the longer-term prospects of LTE-V in contributing to successful implementation of connected vehicles.

Respectfully submitted,

HUAWEI TECHNOLOGIES, INC. (USA) AND
HUAWEI TECHNOLOGIES CO., LTD.

Timothy Jeffries
Director, North America Regulatory &
Spectrum Policy
(469) 277-5912
timothy.jeffries@huawei.com

/s/ Dennis J. Amari
Dennis J. Amari
Director, Federal and Regulatory Affairs
Huawei Technologies, Inc. (USA)
875 15th Street, NW, Suite 825
Washington DC 20005
(202) 289-6510
dennis.amari@huawei.com

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